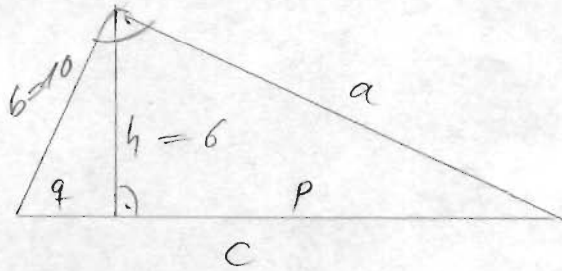


2.30)

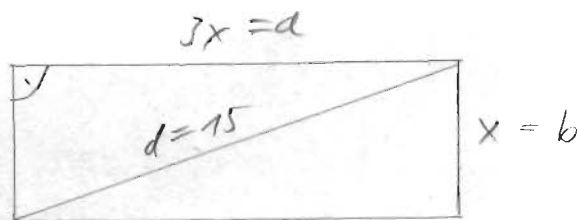


$$b^2 = h^2 + q^2 \Rightarrow q = \sqrt{b^2 - h^2} = \sqrt{100 - 36} = \sqrt{64} = 8 \text{ cm}$$

$$b^2 = qc \Rightarrow c = \frac{b^2}{q} = \frac{100}{8} = 12,5 \text{ cm}$$

$$a^2 + b^2 = c^2 \Rightarrow a = \sqrt{c^2 - b^2} = \sqrt{12,5^2 - 100} = \sqrt{56,25} = 7,5 \text{ cm}$$

2.31)



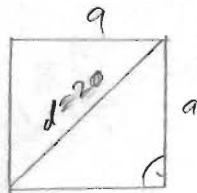
$$x^2 + (3x)^2 = 15^2 \Leftrightarrow 10x^2 = 225$$

$$\Leftrightarrow x^2 = 22,5 \Leftrightarrow x = 4,74 \text{ cm} = b$$

$$3x = 14,22 \text{ cm} = a$$

2.32)

$$A = a^2$$

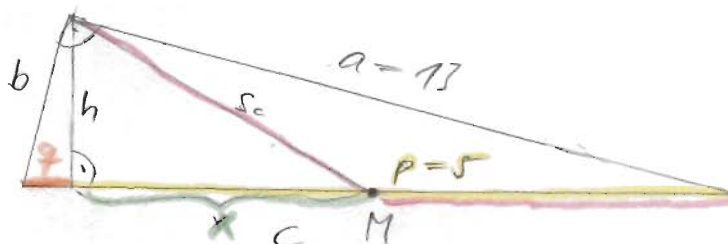


$$a^2 + a^2 = d^2 \Leftrightarrow 2a^2 = d^2$$

$$\Leftrightarrow 2A = d^2 \Leftrightarrow A = \frac{d^2}{2} = \frac{20^2}{2}$$

$$= \frac{400}{2} = 200 \text{ cm}^2$$

2.33)



$$a^2 = pc \Rightarrow c = \frac{a^2}{p} = \frac{13^2}{5} = \frac{169}{5} = 33,8 \text{ cm}$$

$$q = c - p = 33,8 - 5 = 28,8 \text{ cm}$$

$$h^2 = pq \Rightarrow h = \sqrt{pq} = \sqrt{5 \cdot 28,8} = 12 \text{ cm}$$

$$b^2 = qc \Rightarrow b = \sqrt{qc} = \sqrt{28,8 \cdot 33,8} = 31,2 \text{ cm}$$

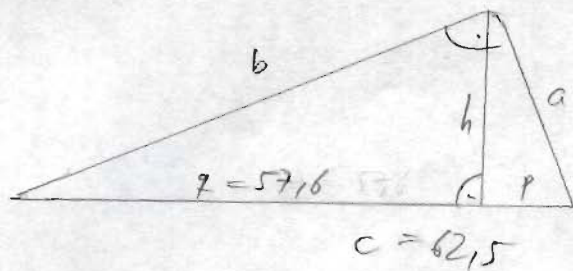
$$\text{nach Thales: } s_c = \frac{c}{2} = \frac{33,8}{2} = 16,9 \text{ cm}$$

$$\text{mit } s_c \text{ so: } x = \left| \frac{c}{2} - q \right| = 11,9$$

$$s_c = \sqrt{h^2 + x^2} = \sqrt{12^2 + 11,9^2} = 16,9 \text{ cm}$$

2.34)

18



$$p = c - q = 62,5 - 57,6 = 4,9 \text{ cm}$$

$$h^2 = pq \Rightarrow h = \sqrt{pq} = \sqrt{4,9 \cdot 57,6} = \sqrt{282,24} = 16,8 \text{ cm}$$

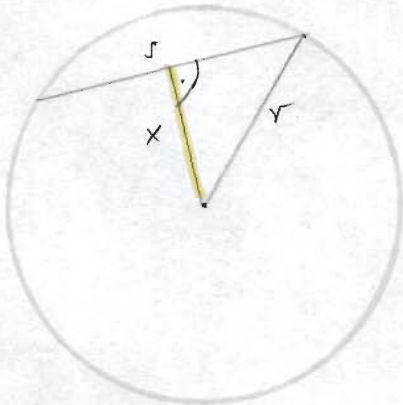
$$a^2 = pc \Rightarrow a = \sqrt{pc} = \sqrt{4,9 \cdot 62,5} = 17,5 \text{ cm}$$

$$b^2 = qc \Rightarrow b = \sqrt{qc} = \sqrt{57,6 \cdot 62,5} = 60 \text{ cm}$$

2.35)

$$s = 10 \text{ cm}$$

$$r = 15 \text{ cm}$$



$$x^2 + \left(\frac{s}{2}\right)^2 = r^2$$

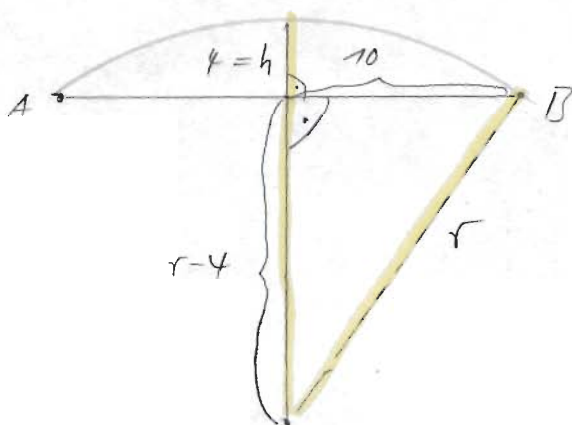
$$x^2 + 5^2 = 15^2$$

$$\Rightarrow x = \sqrt{225 - 25} = \sqrt{200} = 10\sqrt{2}$$

$$x = 14,14 \text{ cm}$$

2.36)

$$\overline{AB} = 20 \text{ m}$$



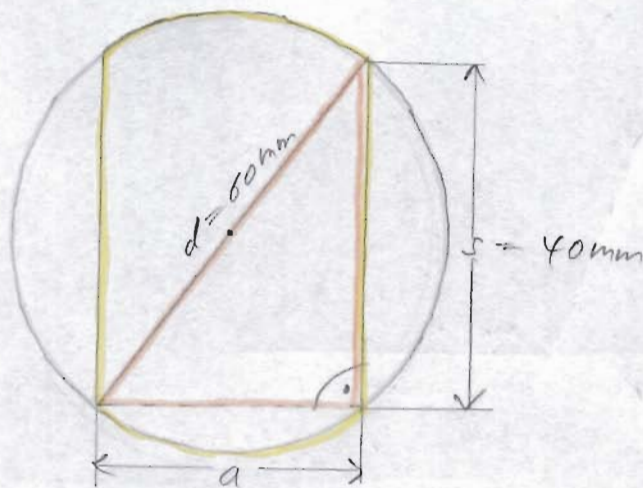
$$r^2 = (r-4)^2 + 10^2$$

$$r^2 = r^2 - 8r + 16 + 100$$

$$8r = 116 \quad | : 8$$

$$r = 14,5 \text{ m}$$

2.37)



$$a^2 + s^2 = d^2$$

$$\Rightarrow a = \sqrt{d^2 - s^2}$$

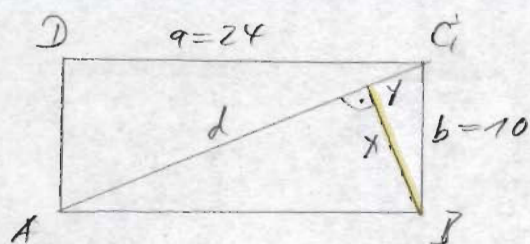
$$= \sqrt{60^2 - 40^2}$$

$$= \sqrt{3600 - 1600}$$

$$= \sqrt{2000} = 44,72 \text{ mm}$$

$$= \sqrt{100 \cdot 20} = 10\sqrt{20}$$

2.38)



$$d^2 = a^2 + b^2$$

$$d = \sqrt{a^2 + b^2} = \sqrt{24^2 + 10^2}$$

$$= 26 \text{ cm}$$

Kath. Satz:

$$b^2 = yd \Rightarrow y = \frac{b^2}{d} = \frac{100}{26}$$

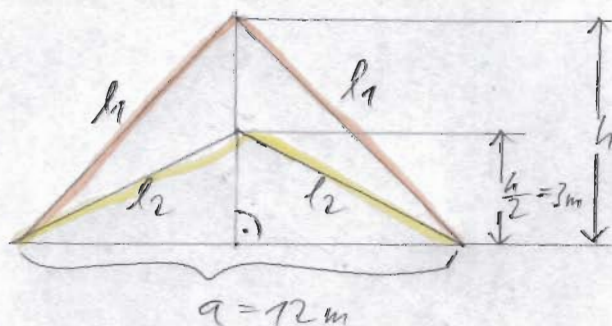
$$= \frac{50}{13} \text{ cm}$$

$$\approx 3,85 \text{ cm}$$

$$\Rightarrow x^2 + y^2 = b^2 \Rightarrow x = \sqrt{b^2 - y^2}$$

$$= \sqrt{100 - \left(\frac{50}{13}\right)^2} = 9,23 \text{ cm} = \frac{120}{13}$$

2.39)



$$h^2 + \left(\frac{a}{2}\right)^2 = l_1^2$$

$$36 + 36 = l_1^2$$

$$l_1 = \sqrt{72} = 8,49 \text{ m}$$

$$\left(\frac{h}{2}\right)^2 + \left(\frac{a}{2}\right)^2 = l_2^2$$

$$9 + 36 = l_2^2$$

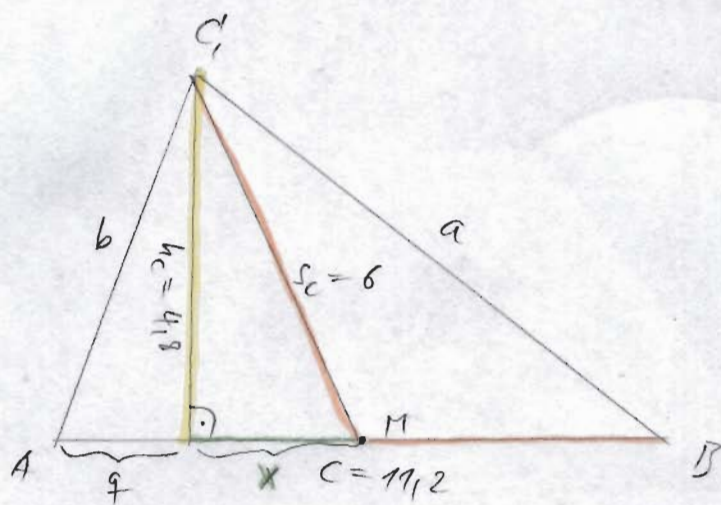
$$l_2 = \sqrt{45} = 6,71 \text{ m}$$

$$l_1 = \sqrt{3 \cdot 2} = \sqrt{6}$$

$$l_2 = \sqrt{9 \cdot 5} = 3\sqrt{5}$$

2.40)

(20)



$$h_c^2 + x^2 = s_c^2 \Rightarrow x = \sqrt{s_c^2 - h_c^2} = \sqrt{6^2 - 4,8^2} = 3,6 \text{ cm}$$

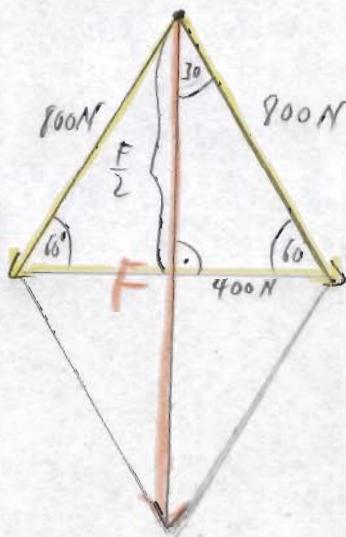
$$q = \frac{c}{2} - x = 5,6 - 3,6 = 2 \text{ cm}$$

$$b^2 = q^2 + h_c^2 \Rightarrow b = \sqrt{q^2 + h_c^2} = \sqrt{4 + 4,8^2} = 5,2 \text{ cm}$$

$$a^2 = h_c^2 + \left(x + \frac{c}{2}\right)^2 = 4,8^2 + 9,2^2 = 107,68$$

$$\Rightarrow a = \sqrt{107,68} = 10,38 \text{ cm}$$

2.41)



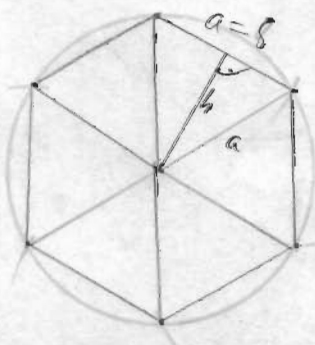
$$\left(\frac{F}{2}\right)^2 + 400^2 = 900^2$$

$$\frac{F^2}{4} = 490000 \cdot 4$$

$$F^2 = 1.920000 = 900\sqrt{3}$$

$$F = 1385,64 \text{ N}$$

2.42)



$$h^2 + \left(\frac{a}{2}\right)^2 = a^2 \Rightarrow h^2 = a^2 - \frac{a^2}{4} = \frac{3a^2}{4}$$

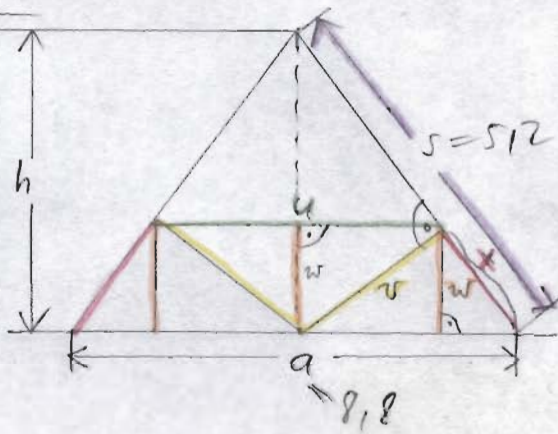
$$\Rightarrow h = \frac{a}{2} \cdot \sqrt{3}$$

$$A_D = \frac{a \cdot h}{2} = \frac{a}{2} \cdot \left(\frac{a}{2} \sqrt{3}\right) = \frac{a^2}{4} \cdot \sqrt{3}$$

$$= \frac{64}{4} \sqrt{3} = 16 \cdot \sqrt{3} = 27,71 \text{ cm}^2$$

$$A_{\text{hexagon}} = 6 \cdot A_D = 96 \sqrt{3} = 166,28 \text{ cm}^2$$


2.43)




$$h^2 + \left(\frac{a}{2}\right)^2 = s^2$$

$$h^2 + 414^2 = 512^2$$

$$h = \sqrt{512^2 - 414^2} = 217,7 \text{ m}$$

Kath.satz: $\left(\frac{a}{2}\right)^2 = x \cdot s \Rightarrow x = \frac{a^2}{4s} = \frac{8,8^2}{4 \cdot 512} = 7,72 \text{ m}$ 

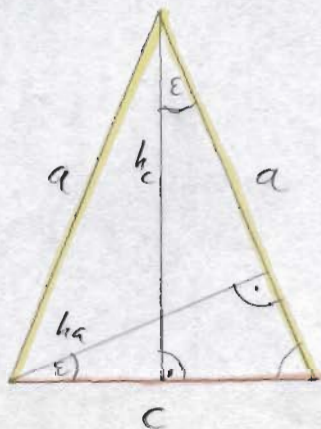
Höhensatz: $v^2 = x(s-x) \rightarrow v = \sqrt{7,72 \cdot 448} = 2,35 \text{ m}$ 

Kath.satz: $v^2 = w \cdot h \Rightarrow w = \frac{v^2}{h} = \frac{2,35^2}{217,7} = 1,99 \text{ m}$ 

$$\left(\frac{u}{2}\right)^2 = w(h-w) = 1,99 \cdot 0,78 = 1,5522$$

$$\Rightarrow u = 2 \cdot \sqrt{1,5522} = 2,49 \text{ m}$$

2.44)



a und c gegeben.

$$h_c^2 + \left(\frac{c}{2}\right)^2 = a^2$$

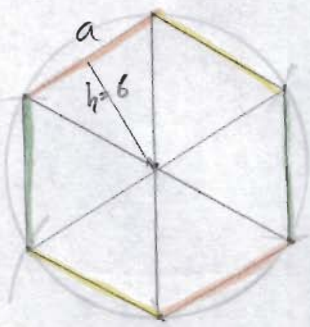
$$h_c = \sqrt{a^2 - \frac{c^2}{4}}$$

$$\frac{h_a}{h_c} = \frac{c}{a} \Rightarrow h_a = \frac{c}{a} \cdot h_c$$

$$h_a = \frac{c}{a} \sqrt{a^2 - \frac{c^2}{4}}$$

nach Abg 2.21

2.45)



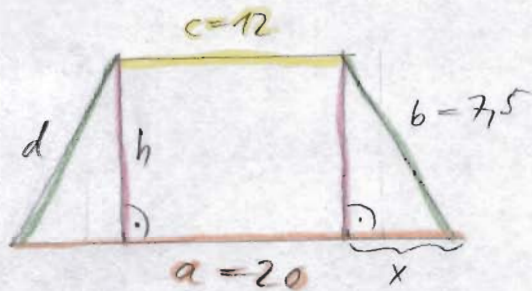
$$h = \frac{a\sqrt{3}}{2} \Leftrightarrow a = \frac{2h}{\sqrt{3}} = \frac{12}{\sqrt{3}}$$

$$A = 6 \cdot \frac{ah}{2} = 3ah = 3 \cdot \frac{12}{\sqrt{3}} \cdot 6 = 72\sqrt{3} = 124,7 \text{ cm}^2$$

$$U = 6a = 6 \cdot \frac{12}{\sqrt{3}} = 41,57 \text{ cm} = 24\sqrt{3}$$

(22)

2.46)



$$x = \frac{a-c}{2} = \frac{8}{2} = 4 \text{ cm}$$

$$h^2 + x^2 = b^2$$

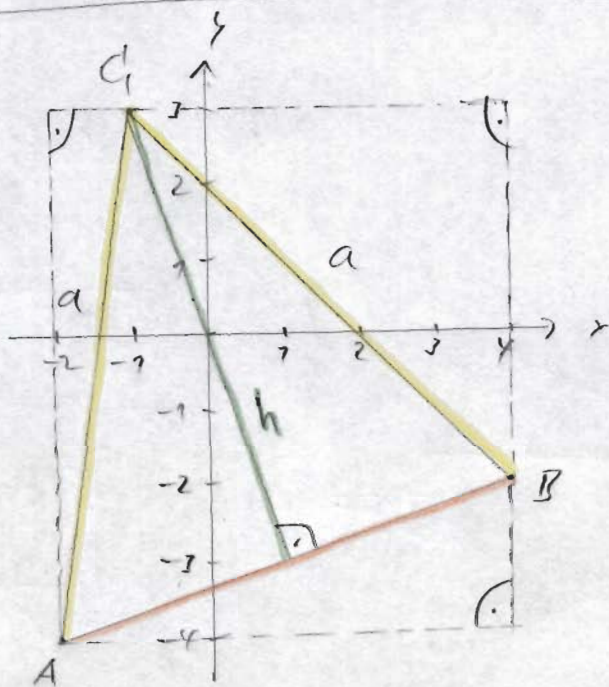
$$\Rightarrow h = \sqrt{b^2 - x^2} = \sqrt{7,5^2 - 16}$$

$$= \sqrt{40,25}$$

$$= 6,34 \text{ cm}$$

$$A = \frac{a+c}{2} \cdot h = \frac{32}{2} \cdot 6,34 = 16 \cdot 6,34 = 101,44 \text{ cm}^2$$

2.47)



$$A = (-2; -4)$$

$$B = (4; -2)$$

$$C = (-1; 3)$$

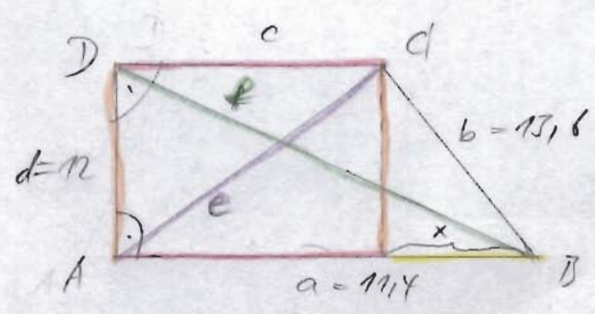
$$\overline{AC}^2 = 1^2 + (3+4)^2 \Rightarrow \overline{AC} = \sqrt{1+49} = \sqrt{50} = 7,07 \text{ cm} = \frac{5\sqrt{2}}{1} = a$$

$$\overline{BC}^2 = (1+4)^2 + (3+2)^2 \Rightarrow \overline{BC} = \sqrt{25+25} = \sqrt{50} = 7,07 \text{ cm}$$

$$\overline{AB}^2 = (2+4)^2 + 2^2 \Rightarrow \overline{AB} = \sqrt{36+4} = \sqrt{40} = 6,32 \text{ cm} = \frac{2\sqrt{10}}{1} = c$$

$$h^2 + \left(\frac{c}{2}\right)^2 = a^2 \Rightarrow h = \sqrt{a^2 - \frac{c^2}{4}} = \sqrt{50 - 10} = \sqrt{40} = 6,32 \text{ cm} = c = 2\sqrt{10}$$

2.48)



$$d^2 + x^2 = b^2 \Rightarrow x = \sqrt{b^2 - d^2} = \sqrt{13,6^2 - 12^2} = 6,4 \text{ cm}$$

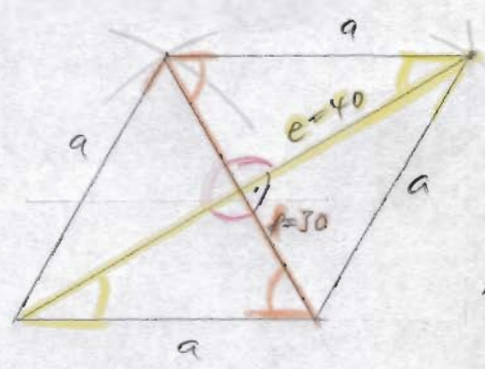
$$\Rightarrow c = a - x = 11,4 - 6,4 = 5 \text{ cm}$$

$$f^2 = d^2 + a^2 \Rightarrow f = \sqrt{d^2 + a^2} = \sqrt{12^2 + 11,4^2} = 16,55 \text{ cm}$$

$$e^2 = c^2 + d^2 \Rightarrow e = \sqrt{c^2 + d^2} = \sqrt{25 + 144} = 15 \text{ cm}$$

$$A = \frac{a+c}{2} \cdot d = \frac{11,4+5}{2} \cdot 12 = 16,4 \cdot 6 = 98,4 \text{ cm}^2$$

2.49)

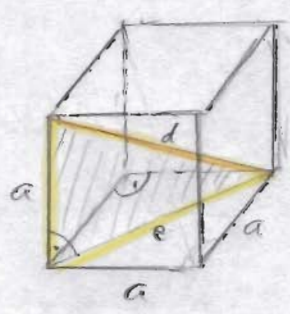


$$a^2 = \left(\frac{e}{2}\right)^2 + \left(\frac{f}{2}\right)^2$$

$$\Rightarrow a = \sqrt{20^2 + 15^2} = 25 \text{ cm}$$

$$A = \frac{e}{2} \cdot f = \frac{40 \cdot 30}{2} = 600 \text{ cm}^2$$

2.50)



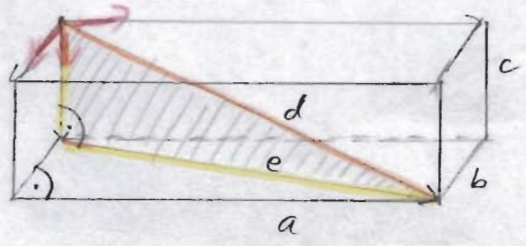
$$a^2 + a^2 = e^2 \Leftrightarrow 2a^2 = e^2$$

$$d^2 = a^2 + e^2 = 3a^2$$

$$\Rightarrow \boxed{d = \sqrt{3} \cdot a}$$

2.57) *Seite* $2x = 2,50$

(2x)



$$e^2 = a^2 + b^2$$

$$d^2 = e^2 + c^2$$

$$d = \sqrt{a^2 + b^2 + c^2}$$

$$F_R = \sqrt{400^2 + 500^2 + 800^2} = \sqrt{1.160.000} = 1077,03 \text{ N}$$

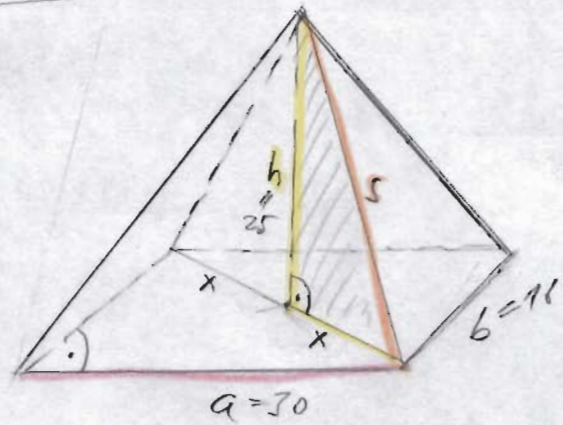
2.52)

$$\sqrt{a^2 + b^2 + c^2} = 2x \Leftrightarrow c^2 = 2x^2 - a^2 - b^2$$

$$\Leftrightarrow c = \sqrt{2x^2 - 20^2 - 8^2}$$

$$= \sqrt{112} = 10,58 \text{ cm} = 4\sqrt{7}$$

2.53)



$$(2x)^2 = a^2 + b^2$$

$$4x^2 = a^2 + b^2$$

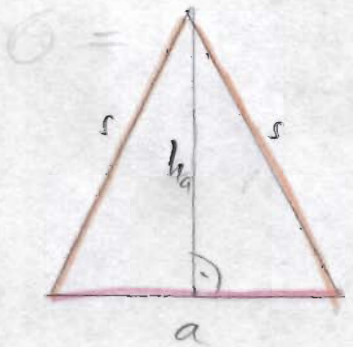
$$x^2 = \frac{a^2 + b^2}{4}$$

$$s^2 = h^2 + x^2 = h^2 + \frac{a^2 + b^2}{4}$$

$$= \frac{4h^2 + a^2 + b^2}{4}$$

$$s = \frac{1}{2} \sqrt{4h^2 + a^2 + b^2}$$

$$s = \frac{1}{2} \sqrt{4 \cdot 25^2 + 30^2 + 16^2} = 30,23 \text{ cm}$$



$$\left(\frac{a}{2}\right)^2 + h_a^2 = s^2 \Rightarrow h_a = \sqrt{s^2 - \frac{a^2}{4}}$$

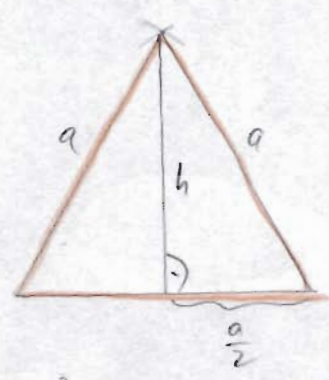
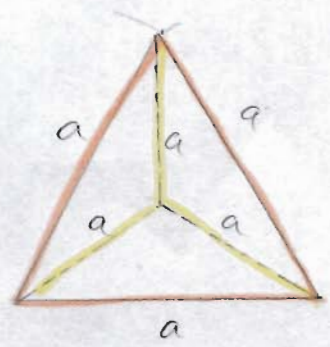
$$A_a = \frac{a}{2} \cdot h_a = \frac{a}{2} \sqrt{s^2 - \frac{a^2}{4}} = 393,69 \text{ cm}^2$$

entweder $A_b = \frac{b}{2} \sqrt{s^2 - \frac{b^2}{4}} = 233,22 \text{ cm}^2$

$$O_p = ab + 2(A_a + A_b) = 30 \cdot 16 + 2(393,69 + 233,22) = 1735,82 \text{ cm}^2$$

$$V_p = \frac{1}{3} abh = \frac{1}{3} \cdot 30 \cdot 16 \cdot 25 = 4000 \text{ cm}^3$$

2.54)

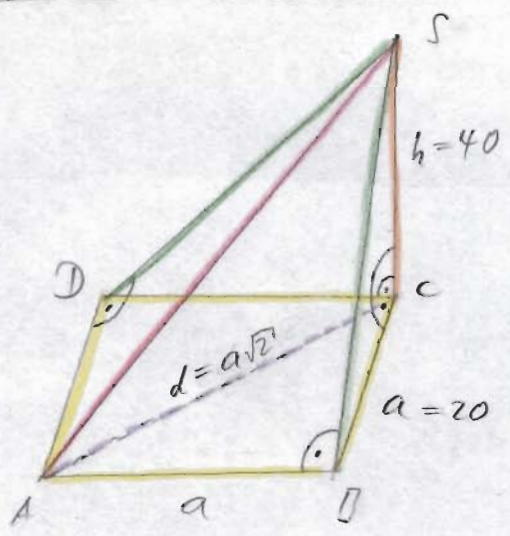


$$h^2 + \left(\frac{a}{2}\right)^2 = a^2 \Rightarrow h^2 = a^2 - \frac{a^2}{4} = \frac{3a^2}{4} \Rightarrow h = \frac{a}{2}\sqrt{3}$$

$$A_{\Delta} = \frac{a}{2} \cdot h = \frac{a}{2} \left(\frac{a}{2}\sqrt{3}\right) = \frac{a^2}{4}\sqrt{3}$$

$$A_{\text{Tetraeder}} = 4A_{\Delta} = a^2\sqrt{3}$$

2.55)



$$a^2 + a^2 = d^2 \Rightarrow d = a\sqrt{2}$$

$$\overline{SA}^2 = (a\sqrt{2})^2 + h^2 = 2a^2 + h^2$$

$$\Rightarrow \overline{SA} = \sqrt{2a^2 + h^2}$$

$$\overline{SB}^2 = a^2 + h^2 = \overline{SD}^2$$

$$\Rightarrow \overline{SB} = \sqrt{a^2 + h^2} = \overline{SD}$$

$$\overline{SA} = \sqrt{800 + 1600} = \sqrt{2400} = \sqrt{400 \cdot 6} = 20\sqrt{6} \approx 49,09 \text{ cm}$$

$$\overline{SB} = \sqrt{400 + 1600} = \sqrt{2000} = \sqrt{400 \cdot 5} = 20\sqrt{5} \approx 44,72 \text{ cm} = \overline{SD}$$

$$A_{BCS} = \frac{ah}{2} = A_{DCS} = \frac{20 \cdot 40}{2} = 400 \text{ cm}^2$$

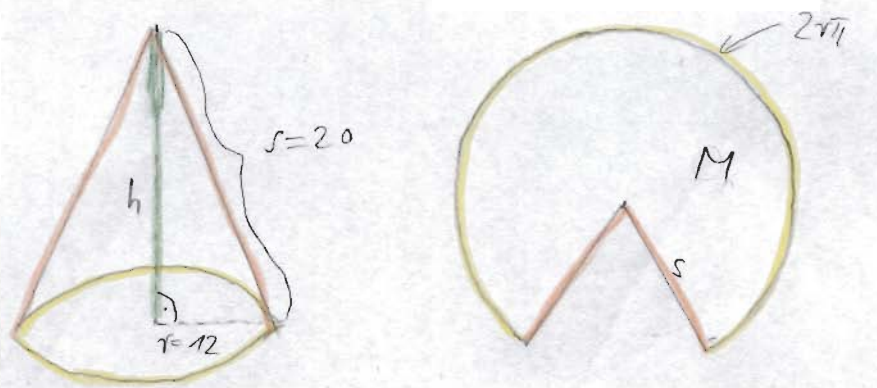
$$A_{DAS} = \frac{\overline{SD} \cdot a}{2} = 10 \cdot \overline{SD} = 200\sqrt{5} = A_{ABS} = \frac{\overline{SB} \cdot a}{2}$$

$$\text{Mantel } M = 2A_{BCS} + 2A_{DAS} = 800 + 400\sqrt{5} = 400(2 + \sqrt{5}) \approx 1694,43 \text{ cm}^2$$

$$\text{Volumen } V = \frac{1}{3} a^2 h = \frac{1}{3} \cdot 20^2 \cdot 40 = 5333\frac{1}{3} \text{ cm}^3$$

2.56)

26

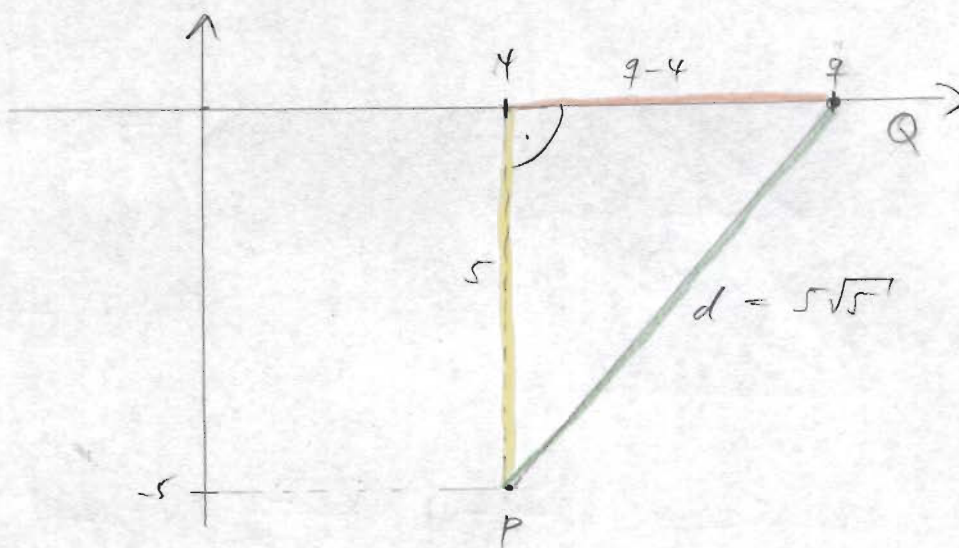


$$h^2 + r^2 = s^2 \Rightarrow h = \sqrt{s^2 - r^2} = \sqrt{20^2 - 12^2} = \sqrt{256} = 16 \text{ cm}$$

$$O = r\pi(r+s) = 12\pi(12+20) = 384\pi \text{ cm}^2 \approx 1206,57 \text{ cm}^2$$

$$V = \frac{1}{3} r^2 \pi h = \frac{1}{3} \cdot 12^2 \pi \cdot 16 = 768\pi \text{ cm}^3 \approx 2412,74 \text{ cm}^3$$

2.57)



$$(9-4)^2 + 5^2 = d^2 \Leftrightarrow (9-4)^2 + 25 = 25 \cdot 5$$

$$\Leftrightarrow (9-4)^2 = 25 \cdot 4 = 100 \Leftrightarrow 9-4 = \pm 10$$

$$q_1 = 10 + 4 = 14; \quad q_2 = -10 + 4 = -6$$